Name: Date:
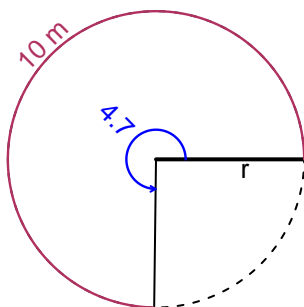
Trig Final (SLTN v640)

- You can use a calculator (like Desmos)
- You should have a unit-circle with special angles and coordinates marked.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 4.7 radians. The arc length is 10 meters. How long is the radius in meters?
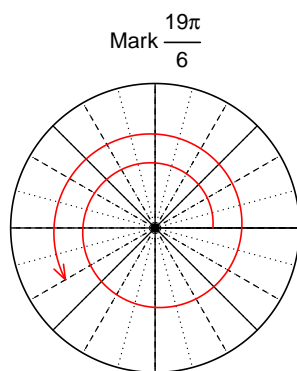

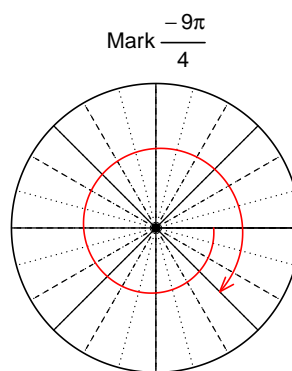$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

$r = 2.128$ meters.

Question 2

Consider angles $\frac{19\pi}{6}$ and $\frac{-9\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{19\pi}{6}\right)$ and $\cos\left(\frac{-9\pi}{4}\right)$ by using a unit circle (provided separately).

Mark $\dfrac{19\pi}{6}$

Find sin(19π/6)
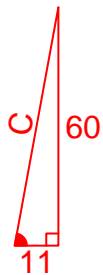

Mark $\dfrac{-9\pi}{4}$

Find cos(−9π/4)

$\sin(19\pi/6) = \frac{-1}{2}$

$\cos(-9\pi/4) = \frac{\sqrt{2}}{2}$

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Question 3

If $\tan(\theta) = \frac{60}{11}$, and θ is in quadrant III, determine an exact value for $\cos(\theta)$.
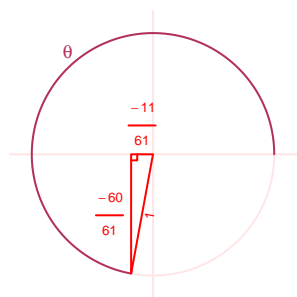
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.

Solve the Pythagorean Equation

$$11^2 + 60^2 = C^2$$
$$C = \sqrt{11^2 + 60^2}$$
$$C = 61$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.

$$\cos(\theta) = \frac{-11}{61}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = -2.76$ meters, a frequency of 8.38 Hz, and an amplitude of 5.52 meters. At $t = 0$, the mass is at the midline and moving down. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -5.52 \sin(2\pi 8.38t) - 2.76$$

or

$$y = -5.52 \sin(16.76\pi t) - 2.76$$

or

$$y = -5.52 \sin(52.65t) - 2.76$$

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